SECRET
(When Filled In)

SPEED LETTER

REPLY REQUESTED				DATE
	YES	X	NO	24 December 1968

LETTER NO.

TO : Technical Advisor, IAS

ATTN:

FROM: [redacted] TSSG/DED/R&DRr-I 25X1

SUBJECT: Installation of Prototype Twin-Stage PI Comparator

REFERENCE: IAS/TA-59/68 Memorandum Dated 27 Nov 68

The referenced memorandum requested electrical and environmental requirements of the subject device. Attached is the preliminary Installation Engineering Data sheet giving this data. As previously discussed, this data will be correlated with the temperature/humidity vs. time data that is presently being collected for your tentative installation site to determine the accuracy of the comparator.

[redacted] 25X1

SIGNATURE

REPLY

DATE

SIGNATURE

RESPONDER'S FILE

FORM 5-61 1831

SECRET

INSTALLATION ENGINEERING DATA

Date form completed 18 December 1968

(See Remarks at end of form)

Tentative /X/ Valid until _____

Final data /___/

I. INSTRUMENT

A. Name of instrument: Twin-Stage On-Line PI Comparator

25X1 B. Manufacturer: [redacted]

C. Contract number: _____

D. Delivery date: Tentative: Mid Oct. Final: _____

II. PHYSICAL FEATURES

A. Sub-assemblies:

1. Number of sub-assemblies: 2 (Chair not included but a deliverable item)
2. Largest sub-assembly: Weight 950 lbs; 48 " H x 48 " W x 34 " DComparator
3. Heaviest sub-assembly: Weight ___ lbs; ___ " H x ___ " W x ___ " D
4. Other sub-assembly (rack) 350 lbs. 52" Hx 22" W x 26" D

B. Assembled instrument:

1. Number of major components: 2
2. Largest component: Weight 950 lbs; 48 " H x 48 " W x 34 " D
3. Heaviest component: Weight 950 lbs; 48 " H x 48 " W x 34 " D
4. Total floor space required after assembly, including maintenance access space. 4 Ft. 6 In. High x 9 Ft. 0 In. Wide x 7 Ft. 0 In. Deep.
5. Total weight of assembled instrument: 1200 lbs.

C. Type of base of mount: Flat ___: 3-point suspension ___; 4-point suspension X

D. Does the instrument have built-in mobility? Yes X No ___

E. Is the instrument particularly sensitive to vibration? Yes X No ___
Will the instrument generate vibration? Yes ___ No X

F. Are any special or unusual tools or fixtures necessary or adviseable for the installation of the maintenance of this instrument? Yes ___ No X.
If "Yes," please describe: _____

III. UTILITIES

A. Electrical:

	AC	DC
1. Voltage	115 Volts / 10 Volts	___ Volts / ___
2. Current	5 Amps/phase(single)	___ Amps
3. Frequency	60 cps	
4. Nr. of phases	1 Ph	
5. Nr. of wires	2 with ground	
6. Power required	575 Watts	___ Watts
7. Power factor	N/A (Leading) (Lagging)	

8. Type of outlet: Two prong ___; three prong X; Twist lock ___; Perm.___
9. Type of ground: Building conduit X; Direct earth ground ___.
10. Should the instrument be shielded, either from external electromagnetic signals or to prevent interference with other equipment? Yes ___ No X
If "Yes," to what extent? _____

B. Air conditioning:
1. Desired environment: Room air temperature of 70 °F ± 1.0 °F and relative humidity of 50 % ± 5 %. (Over*)
2. Input Air: Is a direct connection necessary? Yes ____ No X ; Adviseable? Yes ____ No X ; If "Yes," what is the connector type and size? _____ Recommended input air temperture ___ °F ± ___ °F. Relative humidity ___ % ± ___ %. If input air must be filtered, what is the maximum particle size in microns? ____ What particle count? _____/ cu. ft.
3. Output Air: Is a direct connection to the return air duct necessary? Yes ____ No X . Adviseable? Yes ____ No X . Connector type and size? _____. Output air temperature ___ °F ± ___ °F. Relative humidity ___ % ± ___ %. Output heat ___BTU/Hr. Flow of ____CFM. Is output air toxic? Yes ____ No ____; Noxious? Yes ____ No ____.
4. No particle restriction on room air.

C. Plumbing:
1. Is water required? Yes ____ No X ; Pressure X PSIG, flow ___GPM.
2. Type of water required:
Tap ___ °F ± ___ °F Deionized ___ °F ± ___ °F
Tempered ___ °F ± ___ °F Filtered ___ °F ± ___ °F
If filtered, give maximum permissible particle size in microns and the maximum permissible count. _____ microns _____ particles/cu. ft.
3. Pipe required:
Galvanized ____ Copper ____ Size _____
Stainless Steel ____ Plastic ____ Type of connector _____
4. Floor drain:
Diameter of drain ____ Galvanized drain? ____
Plastic drain? ____ Glass drain? ____
5. Are any chemical solutions used in the device? Yes ____ No X . If "Yes," state the nature of the solution(s), permissible temperature range, flow rate in appropriate units and the filtration necessary for each solution _____.
6. Size of pipes and connectors _____.

D. Compressed air:
Is compressed air required? Yes ____ No X . Water free? ____ Oil Free? ____
Type and size of connector? _____. Pressure _____PSIG. Flow in CFM
Maximum ____, minimum ____, average ____.

E. Vacuum:
Is vacuum required? Yes ____ No X . Pressure ____PSIA or (inches of water) (millimeters of mercure). Displacement in CFM, maximum _____, minimum _____, average _____. Type and Size of connectors _____.

F. Peripheral Devices:
Will the instrument be connected to any peripheral devices such as a computer or data input or data output device? Yes X No ____. If "Yes," give, in detail, the nature of the connection to the peripheral device such as coaxial cable, multiple wire connector, etc. On line to the central computer see specification. Government will furnish male plug which is Amphenol 5 pin #126-217

IV. REMARKS
A. Use additional sheets if more space is required for environmental conditions or utilities not mentioned above.
B. Submit three typed copies of the completed form to the Technical Representative.

*The instrument can be calibrated at a temperature other than 70°; however, the important factor is that temperature fluctuation about the calibrated temperature and rapid changes cause the worst problems; e.g. frequent cold air from successive door openings. The temperature fluctuation is a time dependent variable. If the fluctuation is less than an hour then the error is solely dependent on the coefficient of the glass and/or the film.

C. Attach three copies of a dimensioned outline drawing of each major component and of the completed assembly. Include the estimated weight of each major component and of the completed assembly. Indicate, on the outline drawing of the completed assembly, the space required for access to the instrument for maintenance.

D. If a question does not apply to the instrument, insert "N/A" (Not Applicable) in the appropriate blank space.

Information provided by:

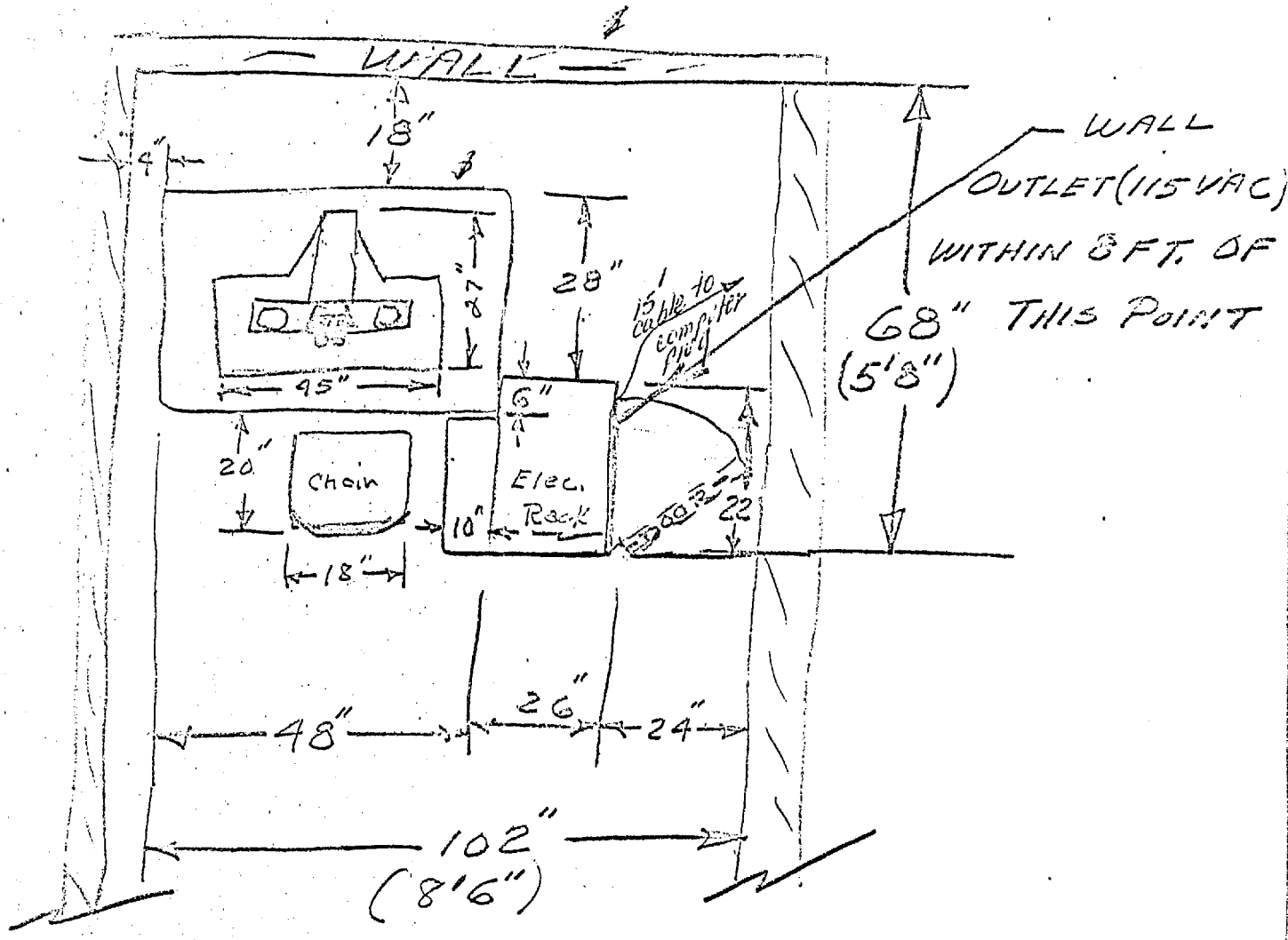
_____
(Signature)

_____
(Position or job title)

DEC 1 0 1968

Recommended Cost Figures

Control #02238



Rack	52H x 22W x 26D (ON WHEELS)	350#
Console	29H x 48W x 34D (ON WHEELS)	450
Comparator	19H x 15W x 27D (ON CONSOLE)	400
	TOTAL	1200#

Minimum 7' x 9'

TEMPERATURE CORRECTION CHART

For a perfect scale measured by a perfect screw, there would be no difference at 68°F. The chart shows the comparator dial differences in microns for measurement of scale intervals at temperatures other than 68°F.

Scale Interval (mm)	TEMPERATURE IN DEGREES FAHRENHEIT															
	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
0-50	+ .2	+ .1	+ .1	0	-.1	- .1	- .2	- .3	- .4	- .4	- .5	- .6	- .6	- .7	- .8	- .8
0-100	+ .4	+ .3	+ .1	0	-.1	- .3	- .4	- .6	- .7	- .8	-1.0	-1.1	-1.3	-1.4	-1.5	-1.7
0-150	+ .6	+ .4	+ .2	0	-.2	- .4	- .6	- .8	-1.0	-1.3	-1.5	-1.7	-1.9	-2.1	-2.3	-2.5
0-200	+ .8	+ .6	+ .3	0	-.3	- .6	- .8	-1.1	-1.4	-1.7	-2.0	-2.2	-2.5	-2.8	-3.1	-3.4
0-250	+1.0	+ .7	+ .4	0	-.4	- .7	-1.0	-1.4	-1.8	-2.1	-2.4	-2.8	-3.2	-3.5	-3.8	-4.2
0-300	+1.3	+ .8	+ .4	0	-.4	- .8	-1.3	-1.7	-2.1	-2.5	-2.9	-3.4	-3.8	-4.2	-4.6	-5.0
0-350	+1.5	+1.0	+ .5	0	-.5	-1.0	-1.5	-2.0	-2.4	-2.9	-3.4	-3.9	-4.4	-4.9	-5.4	-5.9
0-400	+1.7	+1.1	+ .6	0	-.6	-1.1	-1.7	-2.2	-2.8	-3.4	-3.9	-4.5	-5.0	-5.6	-6.2	-6.7
0-450	+1.9	+1.3	+ .6	0	-.6	-1.3	-1.9	-2.5	-3.2	-3.8	-4.4	-5.0	-5.7	-6.3	-6.9	-7.6
0-500	+2.1	+1.4	+ .7	0	-.7	-1.4	-2.1	-2.8	-3.5	-4.2	-4.9	-5.6	-6.3	-7.0	-7.7	-8.4

When using the chart above, the actual interval of measurement can vary and still be within guaranteed tolerance. The amount of variance from the temperature correction chart is the tolerance of the scale plus the tolerance of th lead screw as stated below for each.

For best accuracy, the temperature of the comparator environment should change very little or very slowly. Draft that cause the precision scale to be at a different temperature than the precision lead screw can be a source of error.

25X1 Accuracy of [ ] Type B Scale over full scale is ± 2.5 microns at 68°F.

Accuracy of Precision Lead Screw at 68°F is ± .001 mm or ± .001% of the interval measured from "0", whichever is greater. (Applies to Precision Lead Screws having a 0.5 mm or 1.0 mm lead.)

25X1 [ ] Precision Lead Screws - Coefficient of Linear Expansion 6.4×10^{-6}/deg. F.

[ ] Type B Scale - Coefficient of Linear Expansion 5.4×10^{-6}/deg. F.

The addition of the bars in options 1 and 2 is clearly desirable for enhancing the detectability of the dots. Option 3, therefore, need not be considered unless the presence of the bars is found to interfere with accurate measurement.

There are three possible combinations of options 1 and 2.

Option 1 in one eye - Option 2 in the other:
With this configuration, there is no fusion of the bars and consequently no tendency to attempt to fuse the entire pattern. Total fusion could be a problem if misalignments in reticle positioning are present. Use of two different configurations, however, will introduce problems of binocular rivalry. Fusion of the dots, once located, will suppress this rivalry (Ogle and Wakefield, 1967), but until the dots are perceived the binocularly seen "cross" will tend to be unstable both in configuration and contrast (Kaufman, 1963). This effect will be disturbing and fatiguing but, for this application, it is not expected to create a serious problem.

Option 2 in both eyes:
With the same pattern in each eye, binocular rivalry will be minimized. There will, however, be problems of conflict between the bars and dots unless the reticles are adequately duplicated and aligned. In order to permit fusion of the entire pattern, the individual elements of both patterns must be aligned within the limits shown in Table 2.

TABLE 2: RETICLE PATTERN ALIGNMENT REQUIREMENTS

Direction	Visual Angle Tolerance	Reticle Dimensions
Vertical	17 min [1]	.127 mm
Horizoneal (convergent)	1 deg 44 min [1]	.762 mm
Horizontal (divergent)	34 min [1]	.254 mm
Rotational	n.a.	3 degrees of arc [2]

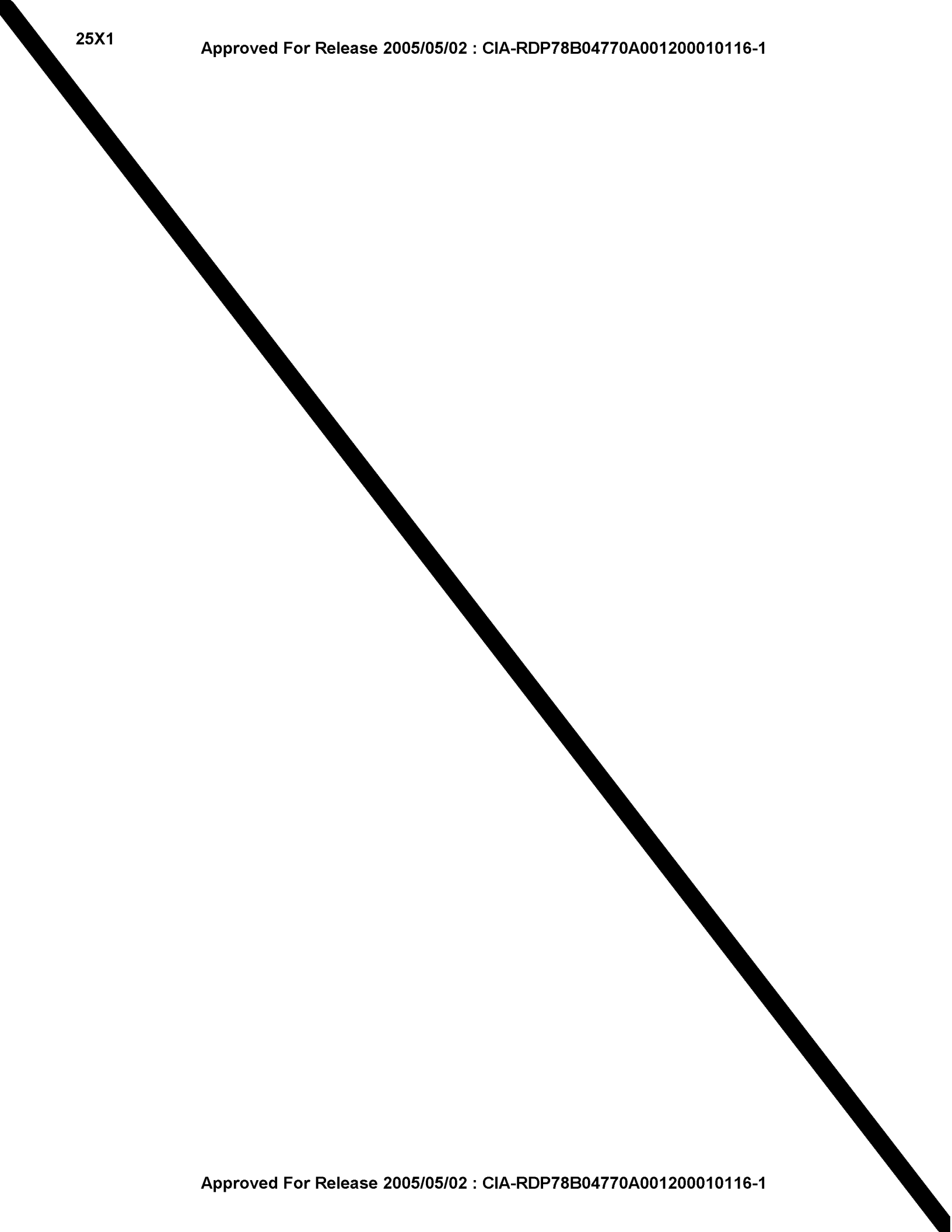
Assumes: far point accommodation
10x eyepiece

Reticle dimensions = tan (visual angle) x $\frac{250 \text{ mm}}{10}$

25X1

1 Ref: [redacted]

2 Estimate, no data available



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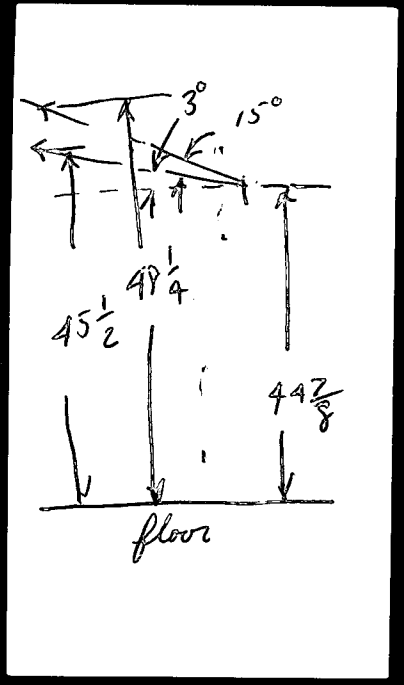
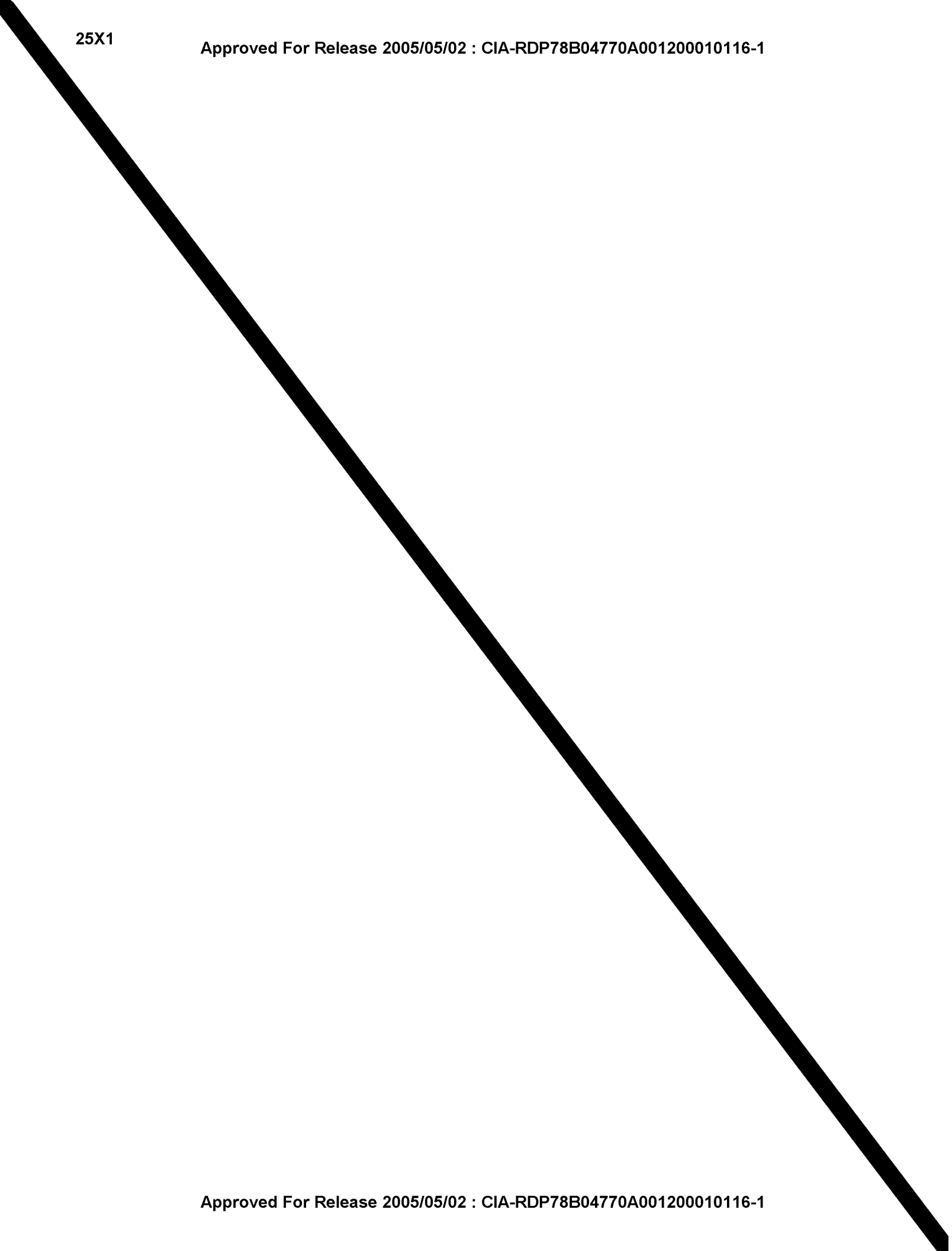

3°
15°
49 1/4
45 1/2
44 7/8
floor



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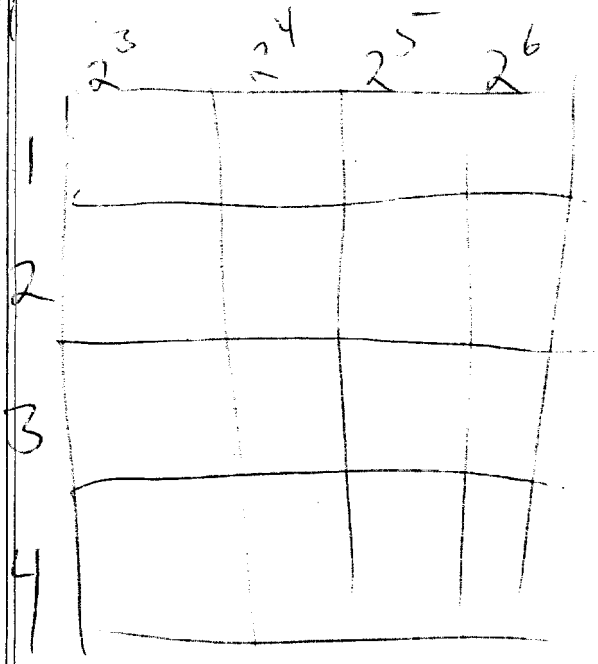

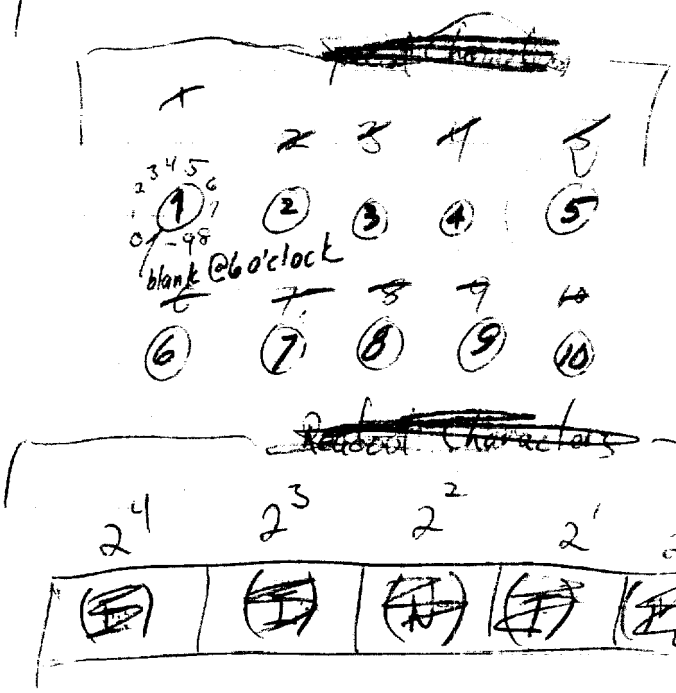

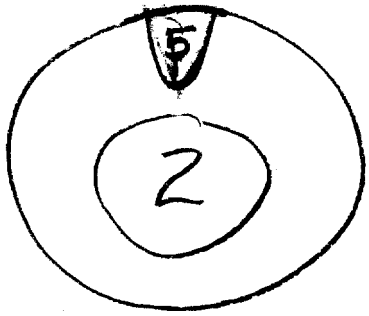

Agreed upon in 7 Nov meeting

25X1

file in Drawing section 022 28

1967 per telephone conversation of this date

Amphenol male 5 pin connector #126-217

A - send
B - common (gnd)
C - chassis gnd
D - receive
E - common (gnd)

15' cable (shielded)

-10V all times not 0.0V. when machine is "off"

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